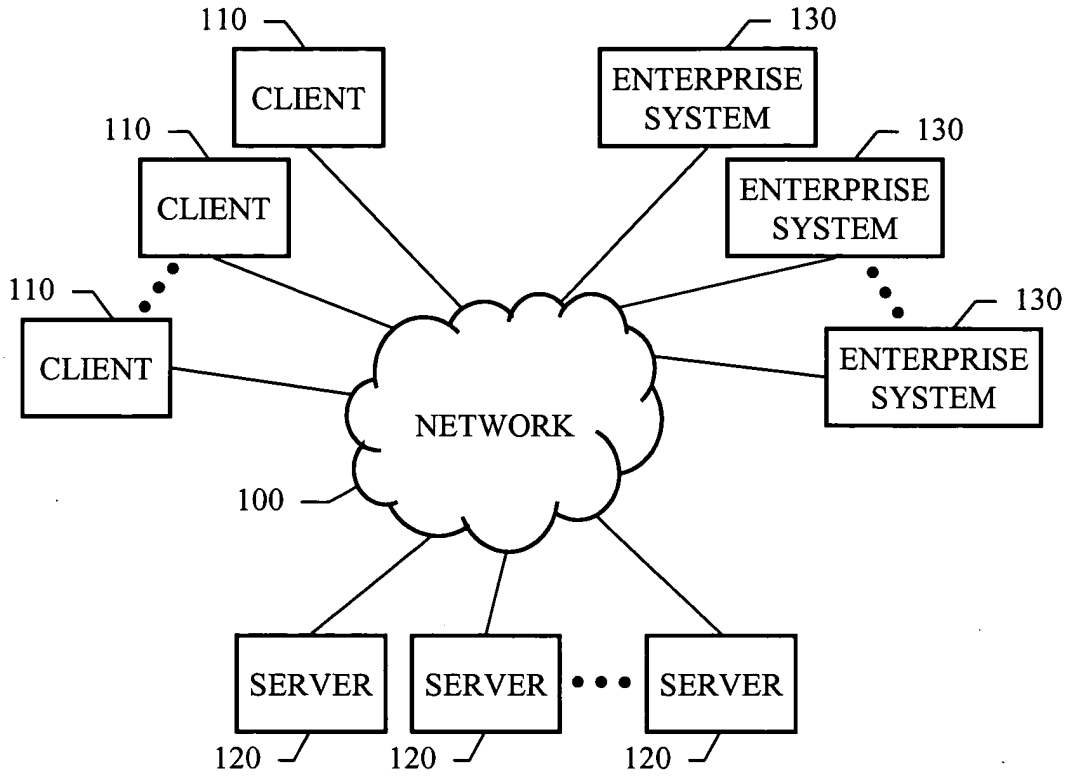

110
CLIENT
110
CLIENT
110
CLIENT
130
ENTERPRISE SYSTEM
130
ENTERPRISE SYSTEM
130
ENTERPRISE SYSTEM
NETWORK
100
SERVER
SERVER
SERVER
120
120
120

FIG. 1

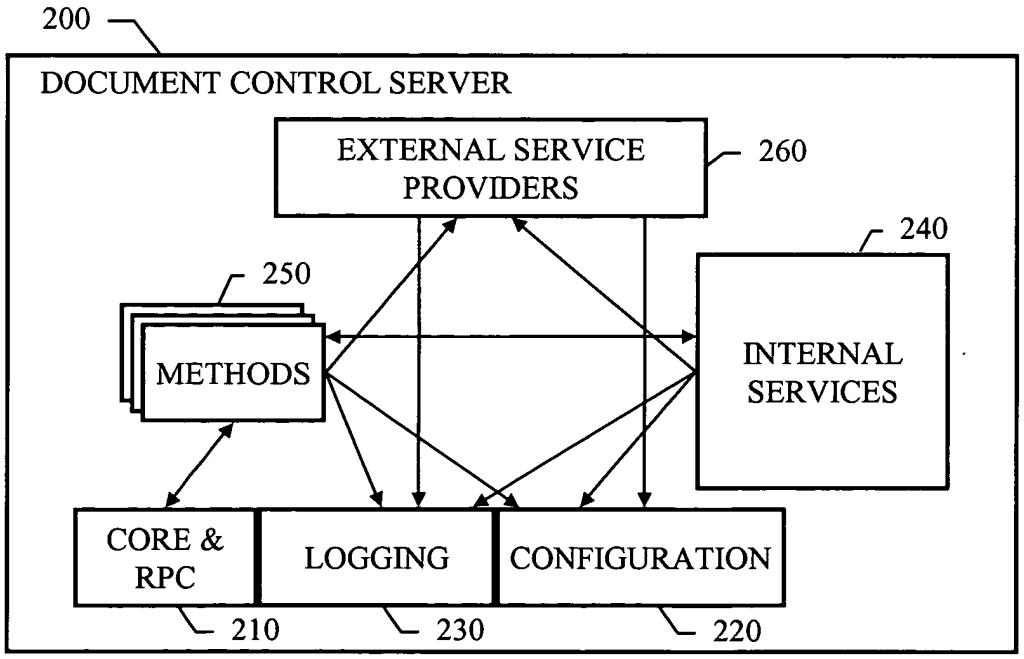

200
DOCUMENT CONTROL SERVER
EXTERNAL SERVICE PROVIDERS
260
240
250
METHODS
INTERNAL SERVICES
CORE & RPC
LOGGING
CONFIGURATION
210
230
220

FIG. 2

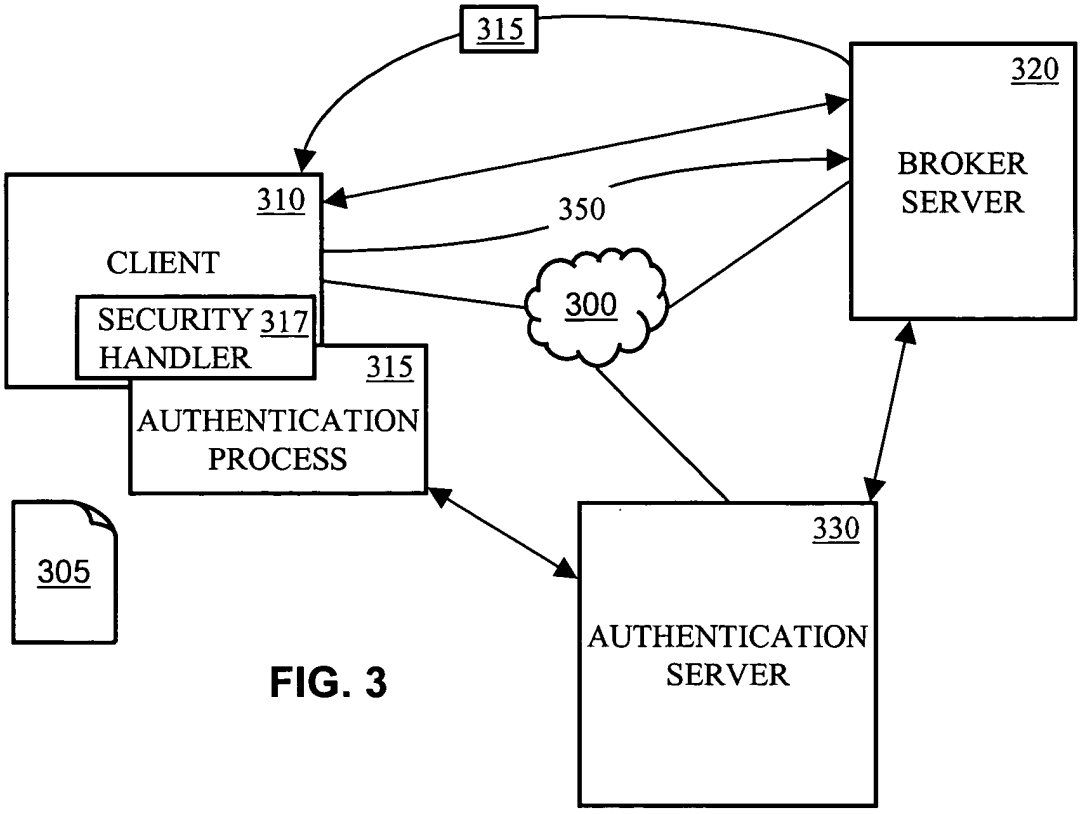

315
320
BROKER SERVER
310
CLIENT
350
300
SECURITY HANDLER 317
315
AUTHENTICATION PROCESS
305
330
AUTHENTICATION SERVER

FIG. 3

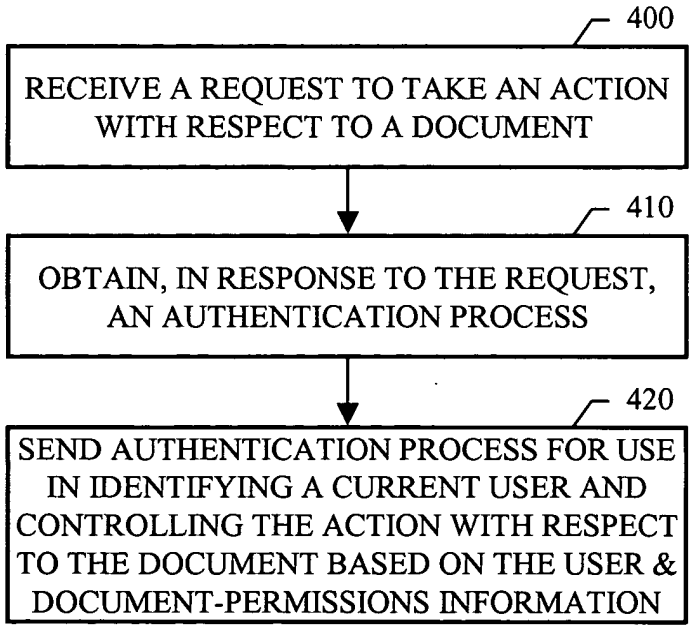

400
RECEIVE A REQUEST TO TAKE AN ACTION WITH RESPECT TO A DOCUMENT
410
OBTAIN, IN RESPONSE TO THE REQUEST, AN AUTHENTICATION PROCESS
420
SEND AUTHENTICATION PROCESS FOR USE IN IDENTIFYING A CURRENT USER AND CONTROLLING THE ACTION WITH RESPECT TO THE DOCUMENT BASED ON THE USER & DOCUMENT-PERMISSIONS INFORMATION

FIG. 4

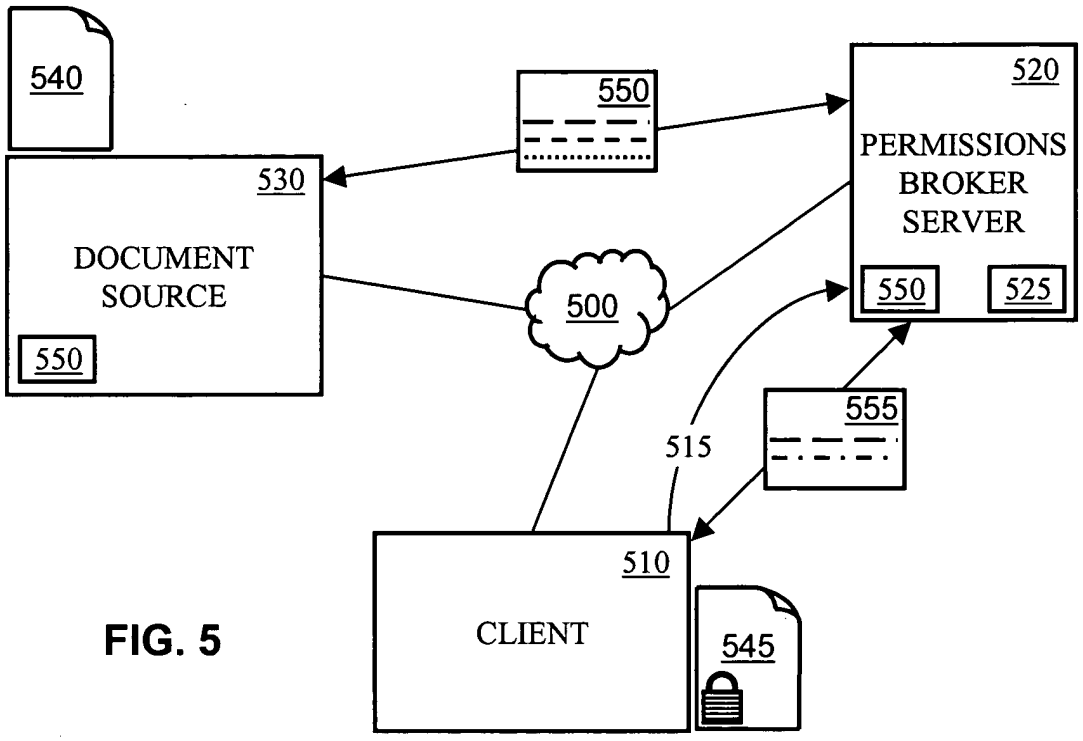

540
550
520
PERMISSIONS BROKER SERVER
530
DOCUMENT SOURCE
550
500
550
525
555
515
510
CLIENT
545

FIG. 5

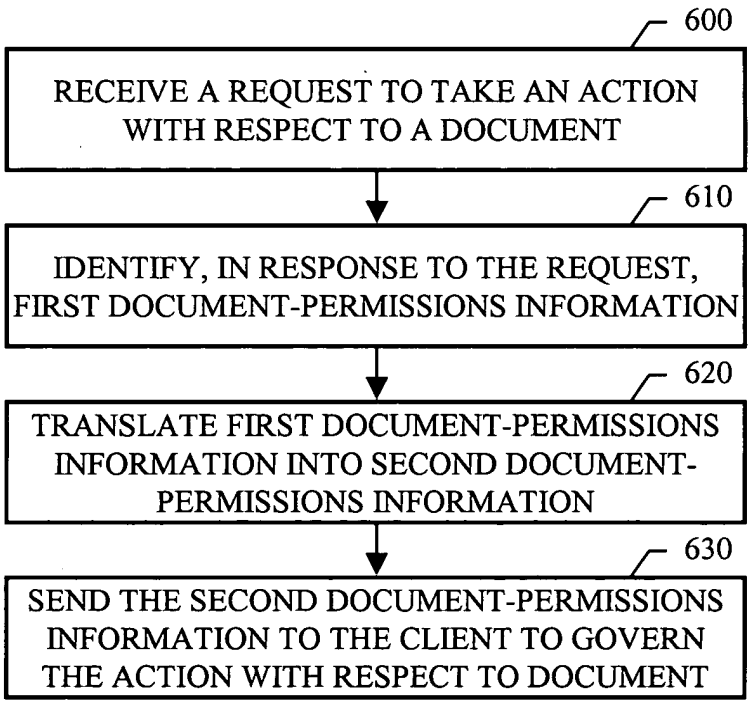

600
RECEIVE A REQUEST TO TAKE AN ACTION WITH RESPECT TO A DOCUMENT
610
IDENTIFY, IN RESPONSE TO THE REQUEST, FIRST DOCUMENT-PERMISSIONS INFORMATION
620
TRANSLATE FIRST DOCUMENT-PERMISSIONS INFORMATION INTO SECOND DOCUMENT-PERMISSIONS INFORMATION
630
SEND THE SECOND DOCUMENT-PERMISSIONS INFORMATION TO THE CLIENT TO GOVERN THE ACTION WITH RESPECT TO DOCUMENT

FIG. 6

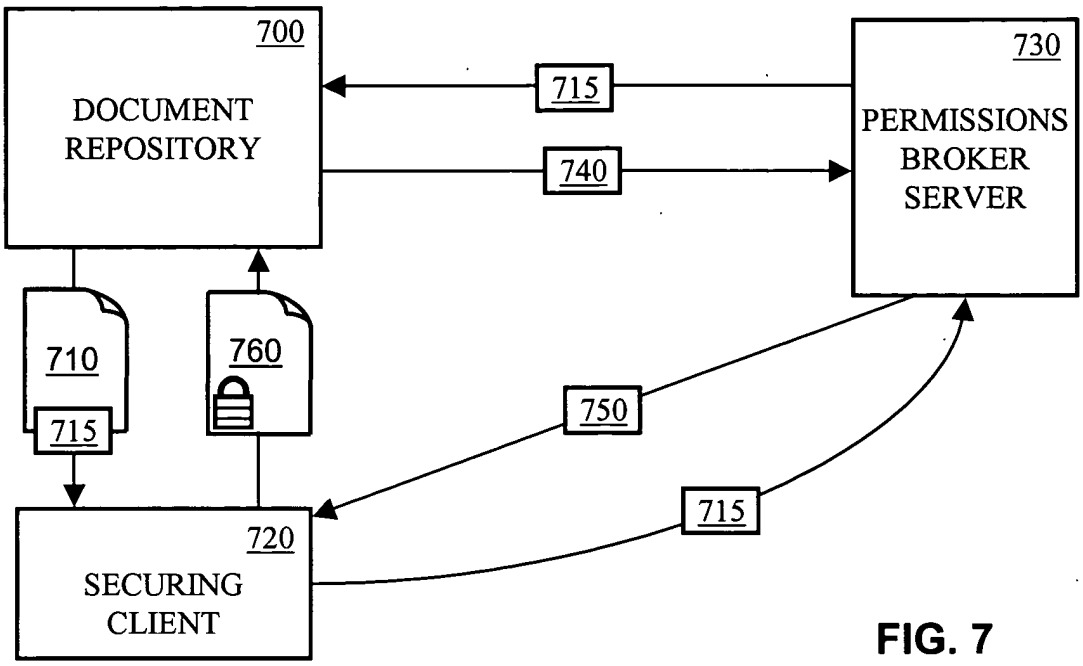

700
DOCUMENT REPOSITORY
715
740
730
PERMISSIONS BROKER SERVER
710
715
760
750
715
720
SECURING CLIENT

FIG. 7

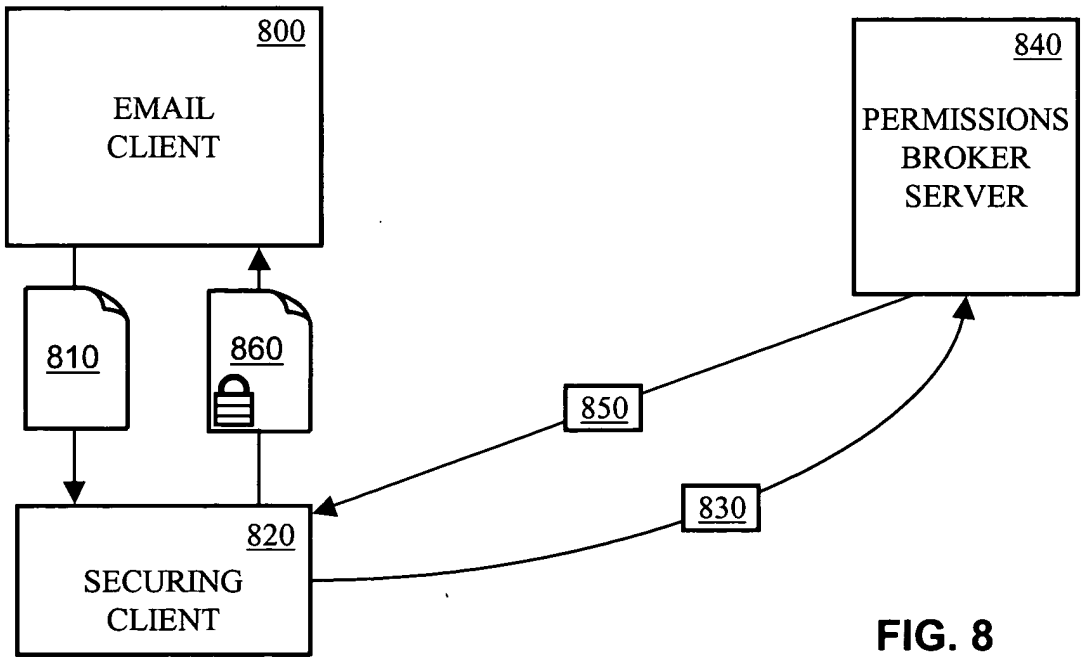

800
EMAIL CLIENT
840
PERMISSIONS BROKER SERVER
810
860
850
830
820
SECURING CLIENT

FIG. 8

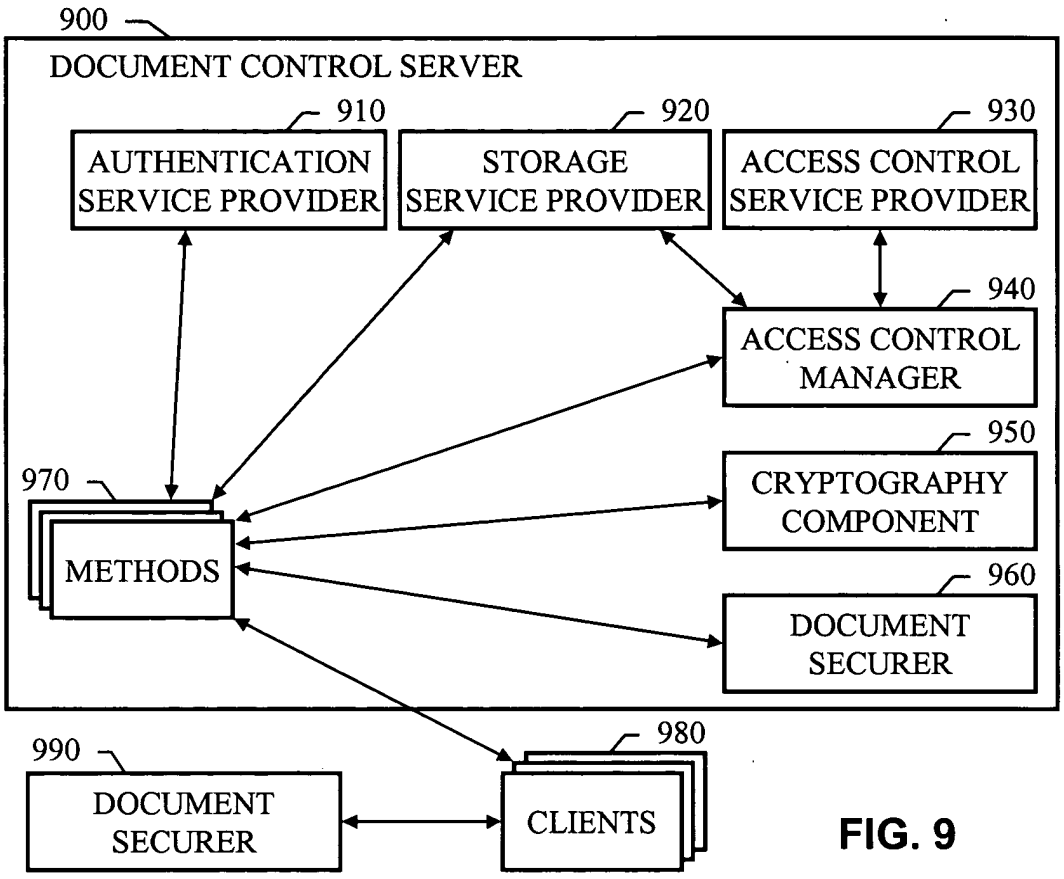

900
DOCUMENT CONTROL SERVER
910
AUTHENTICATION SERVICE PROVIDER
920
STORAGE SERVICE PROVIDER
930
ACCESS CONTROL SERVICE PROVIDER
940
ACCESS CONTROL MANAGER
950
CRYPTOGRAPHY COMPONENT
960
DOCUMENT SECURER
970
METHODS
990
DOCUMENT SECURER
980
CLIENTS

FIG. 9

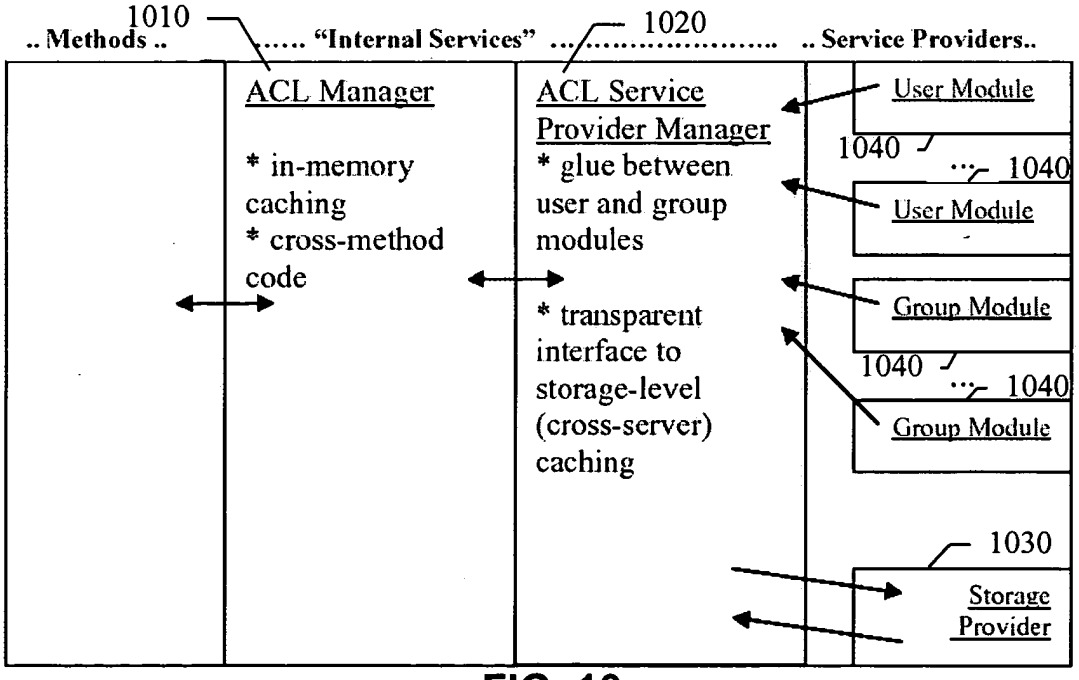

1010
.. Methods ..
..... "Internal Services" .....
1020
.. Service Providers..
ACL Manager
* in-memory caching
* cross-method code
ACL Service Provider Manager
* glue between user and group modules
* transparent interface to storage-level (cross-server) caching
User Module
1040
1040
User Module
Group Module
1040
1040
Group Module
1030
Storage Provider

FIG. 10

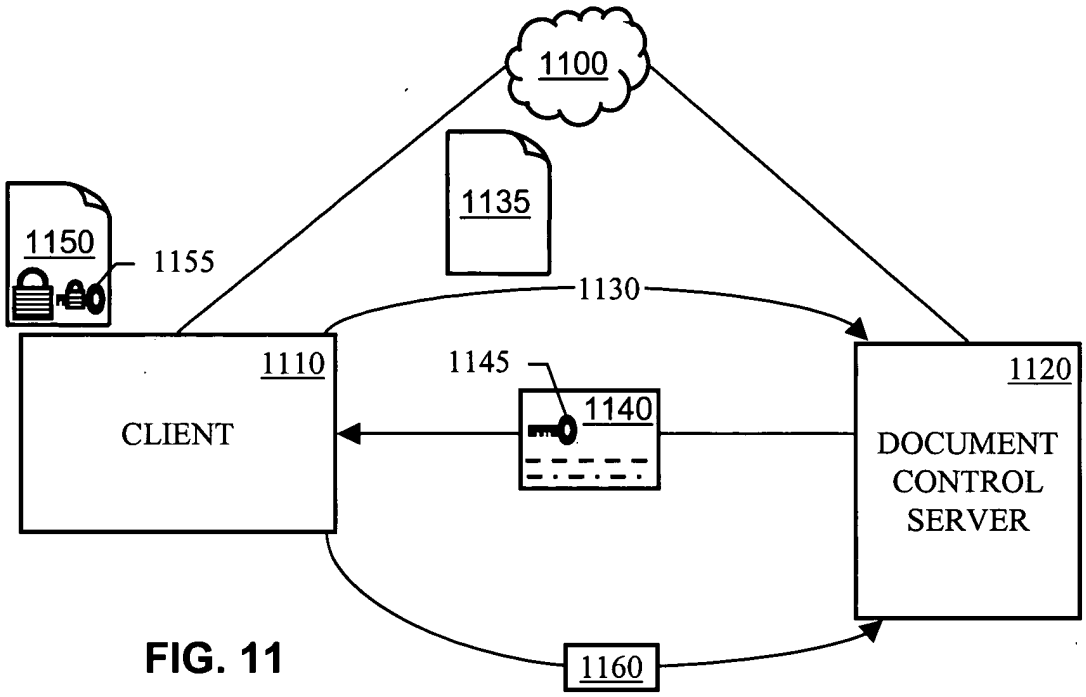

1100
1135
1150
1155
1130
1110
CLIENT
1145
1140
1120
DOCUMENT CONTROL SERVER
1160

FIG. 11

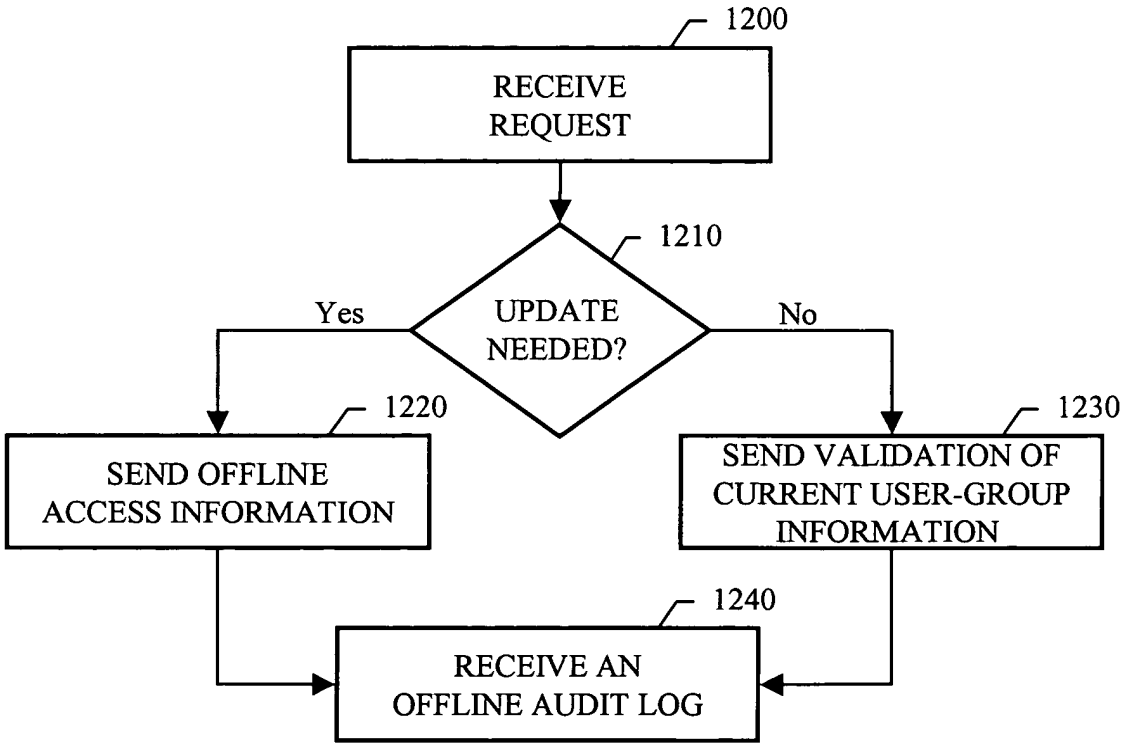

1200
RECEIVE REQUEST
1210
UPDATE NEEDED?
Yes
No
1220
SEND OFFLINE ACCESS INFORMATION
1230
SEND VALIDATION OF CURRENT USER-GROUP INFORMATION
1240
RECEIVE AN OFFLINE AUDIT LOG

FIG. 12

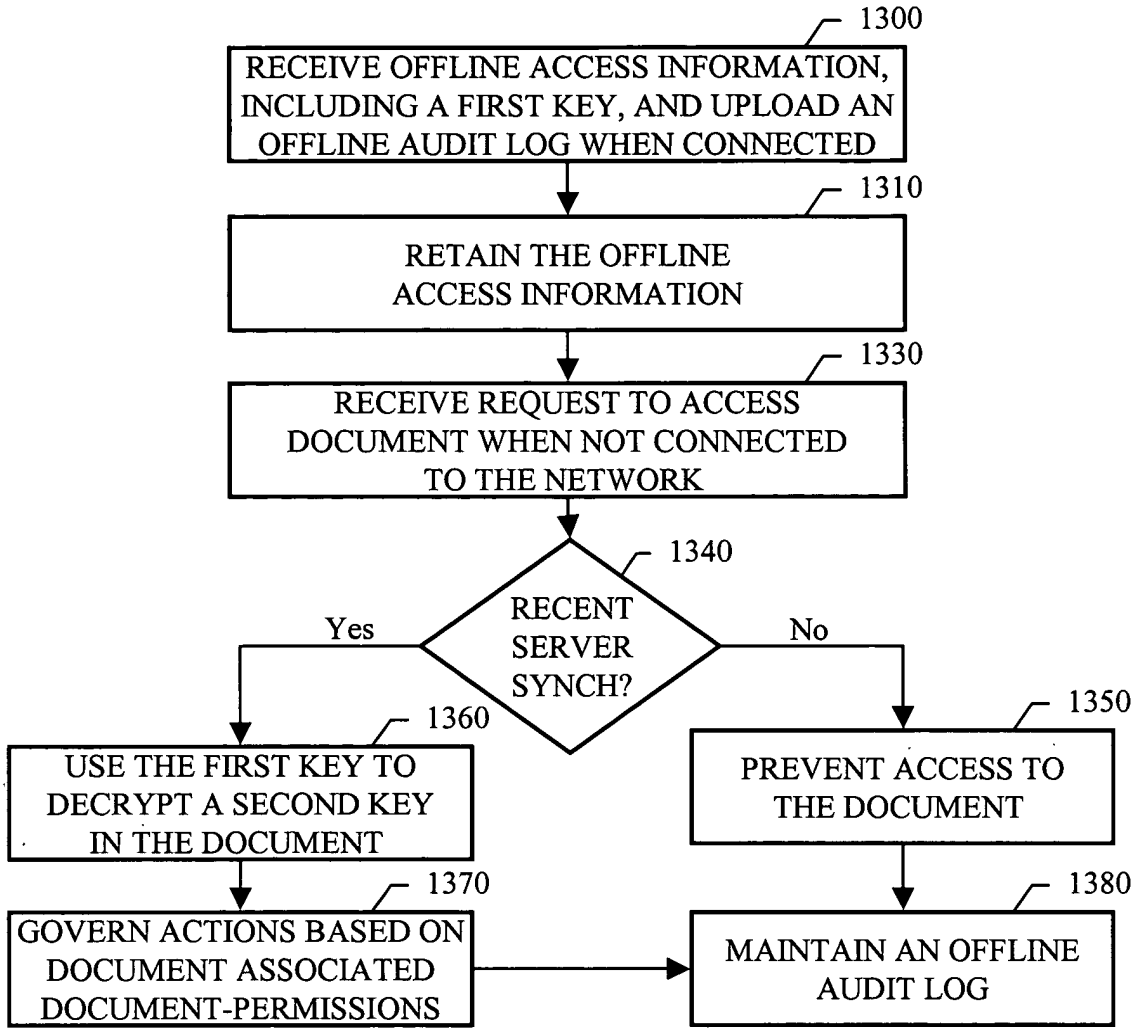
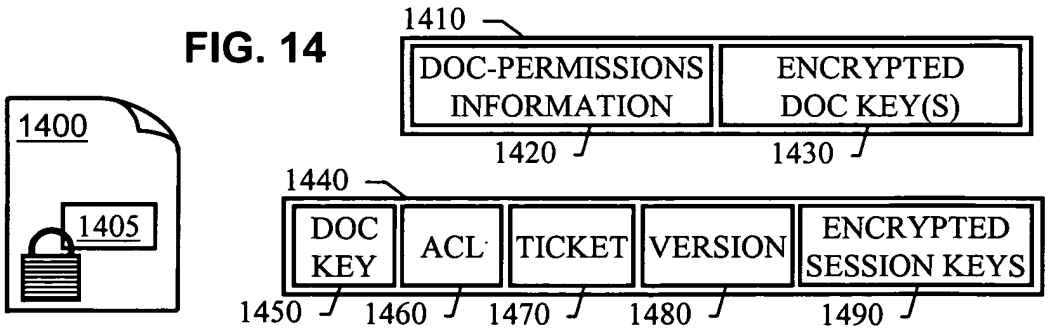

1300
RECEIVE OFFLINE ACCESS INFORMATION, INCLUDING A FIRST KEY, AND UPLOAD AN OFFLINE AUDIT LOG WHEN CONNECTED
1310
RETAIN THE OFFLINE ACCESS INFORMATION
1330
RECEIVE REQUEST TO ACCESS DOCUMENT WHEN NOT CONNECTED TO THE NETWORK
1340
RECENT SERVER SYNCH?
Yes
No
1360
USE THE FIRST KEY TO DECRYPT A SECOND KEY IN THE DOCUMENT
1350
PREVENT ACCESS TO THE DOCUMENT
1370
GOVERN ACTIONS BASED ON DOCUMENT ASSOCIATED DOCUMENT-PERMISSIONS
1380
MAINTAIN AN OFFLINE AUDIT LOG

FIG. 13

FIG. 14


1410
DOC-PERMISSIONS INFORMATION
ENCRYPTED DOC KEY(S)
1420
1430
1400
1405
1440
DOC KEY
ACL
TICKET
VERSION
ENCRYPTED SESSION KEYS
1450
1460
1470
1480
1490

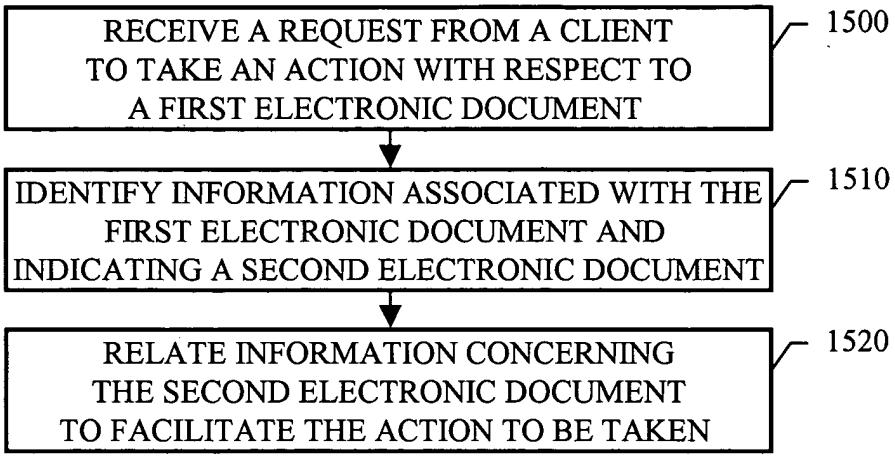


FIG. 15

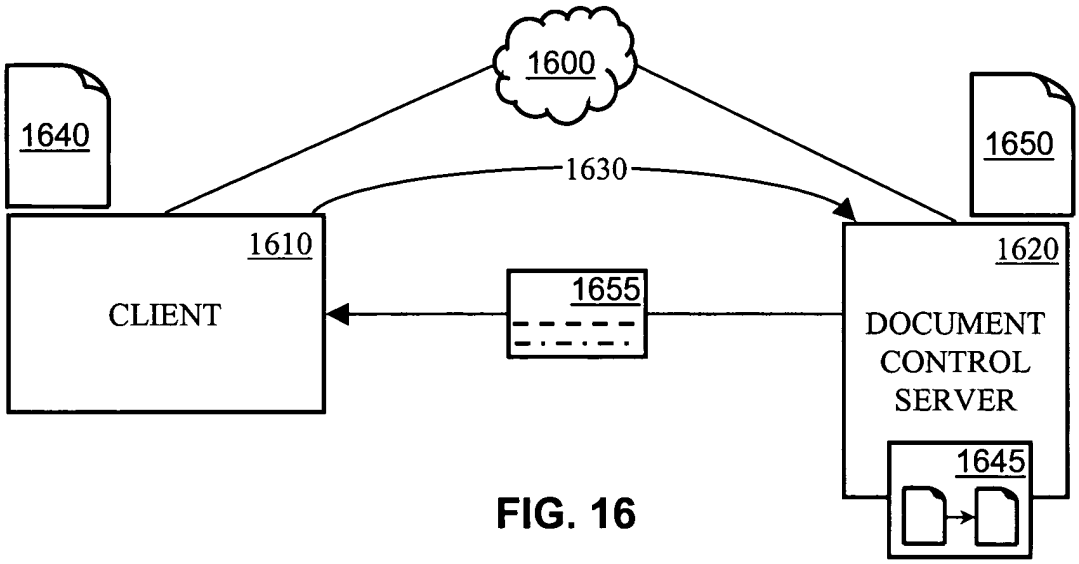


FIG. 16

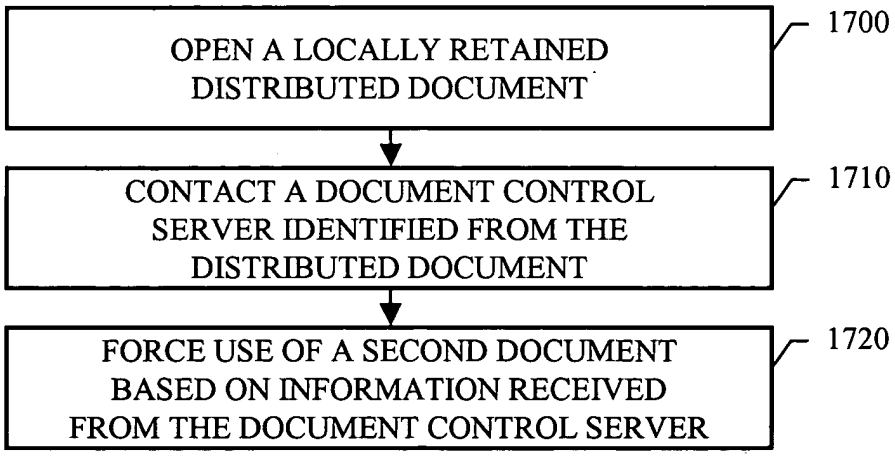


FIG. 17

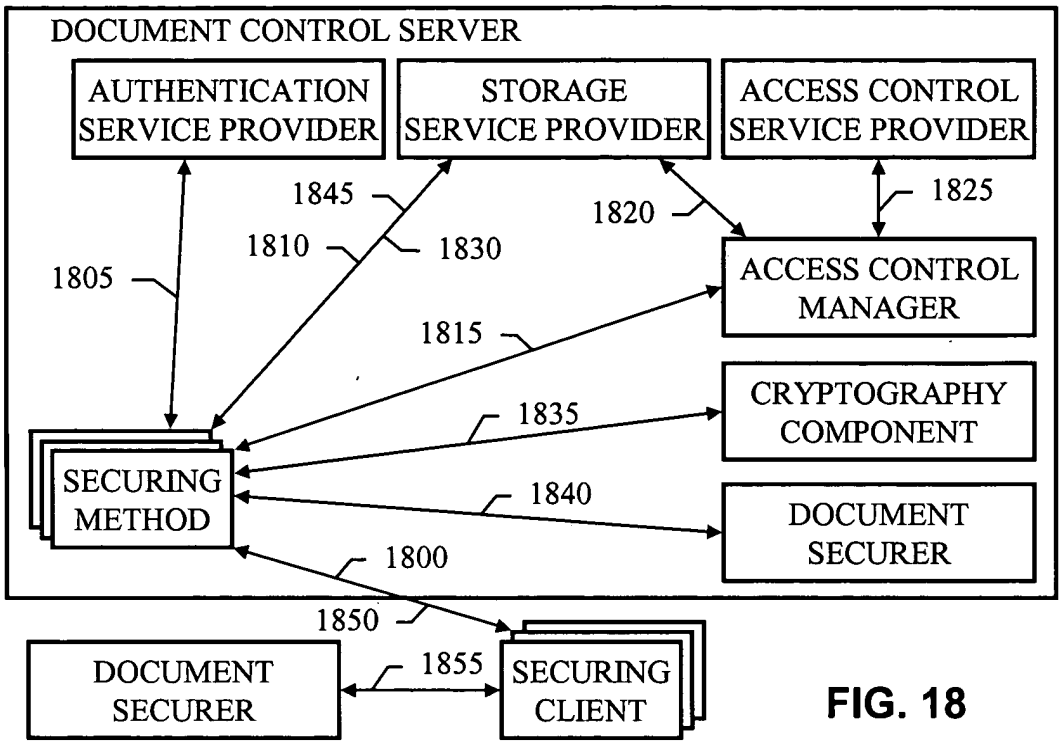

DOCUMENT CONTROL SERVER
AUTHENTICATION SERVICE PROVIDER
STORAGE SERVICE PROVIDER
ACCESS CONTROL SERVICE PROVIDER
1845
1810
1830
1820
1825
1805
ACCESS CONTROL MANAGER
1815
CRYPTOGRAPHY COMPONENT
1835
SECURING METHOD
1840
DOCUMENT SECURER
1800
1850
DOCUMENT SECURER
1855
SECURING CLIENT

FIG. 18

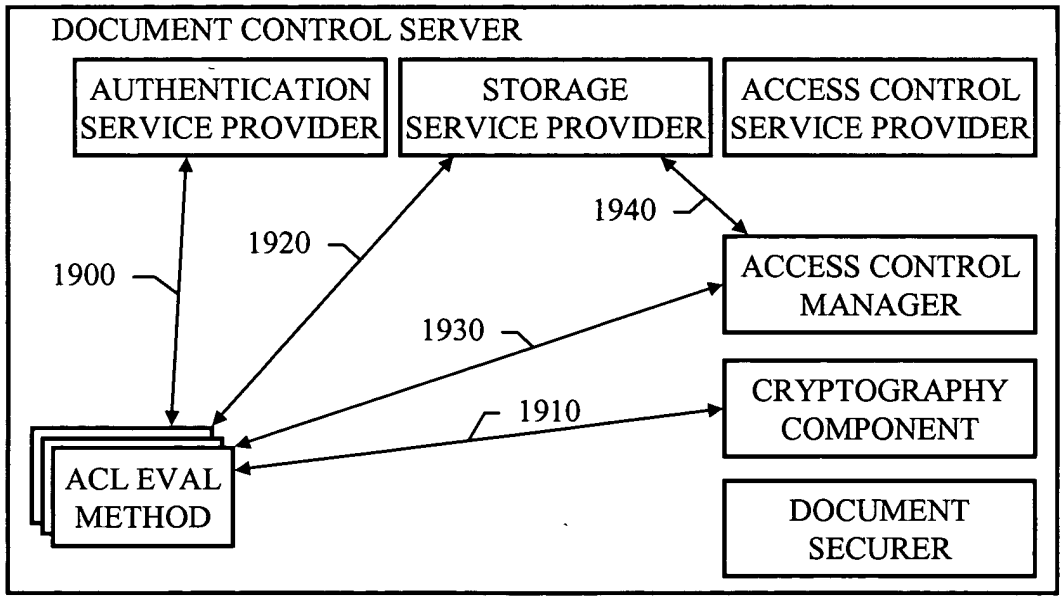

DOCUMENT CONTROL SERVER
AUTHENTICATION SERVICE PROVIDER
STORAGE SERVICE PROVIDER
ACCESS CONTROL SERVICE PROVIDER
1940
1920
1900
ACCESS CONTROL MANAGER
1930
CRYPTOGRAPHY COMPONENT
1910
ACL EVAL METHOD
DOCUMENT SECURER

FIG. 19

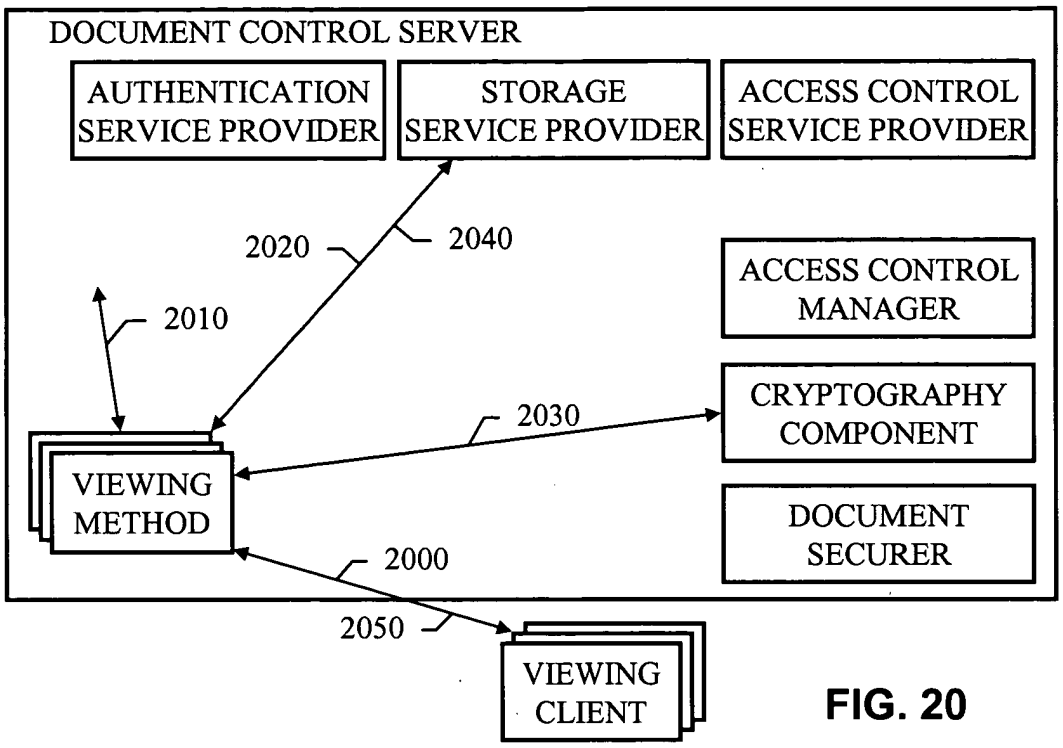

DOCUMENT CONTROL SERVER
AUTHENTICATION SERVICE PROVIDER
STORAGE SERVICE PROVIDER
ACCESS CONTROL SERVICE PROVIDER
2020
2040
2010
ACCESS CONTROL MANAGER
CRYPTOGRAPHY COMPONENT
2030
VIEWING METHOD
DOCUMENT SECURER
2000
2050
VIEWING CLIENT

FIG. 20

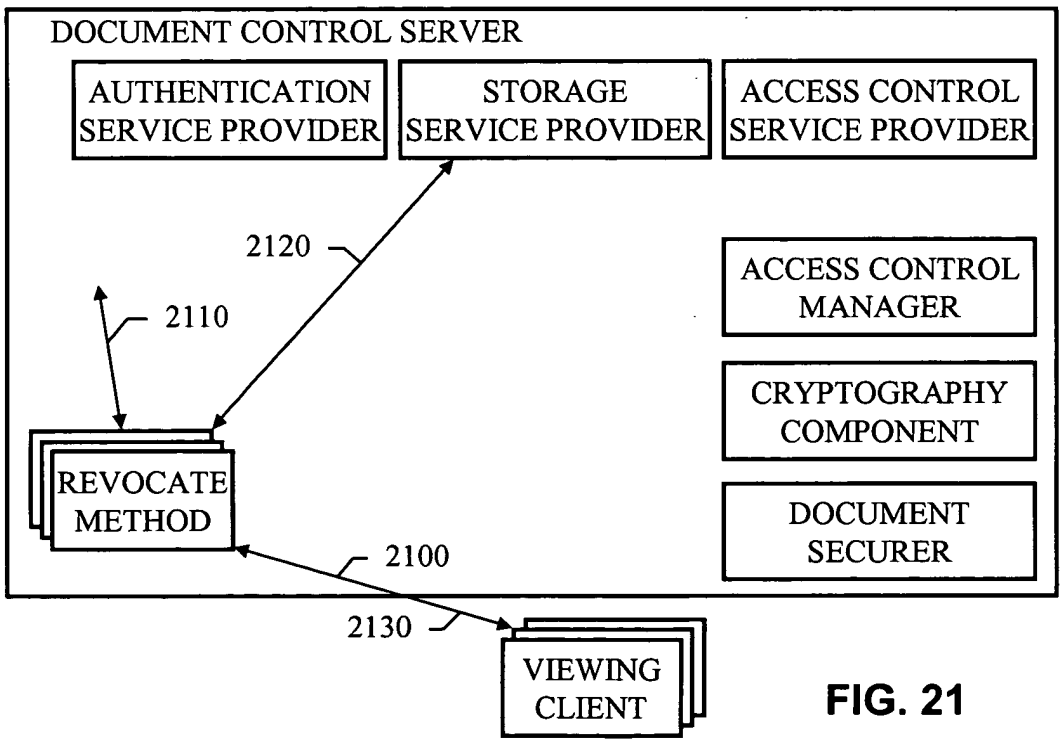

DOCUMENT CONTROL SERVER
AUTHENTICATION SERVICE PROVIDER
STORAGE SERVICE PROVIDER
ACCESS CONTROL SERVICE PROVIDER
2120
ACCESS CONTROL MANAGER
2110
CRYPTOGRAPHY COMPONENT
REVOCATE METHOD
DOCUMENT SECURER
2100
2130
VIEWING CLIENT

FIG. 21

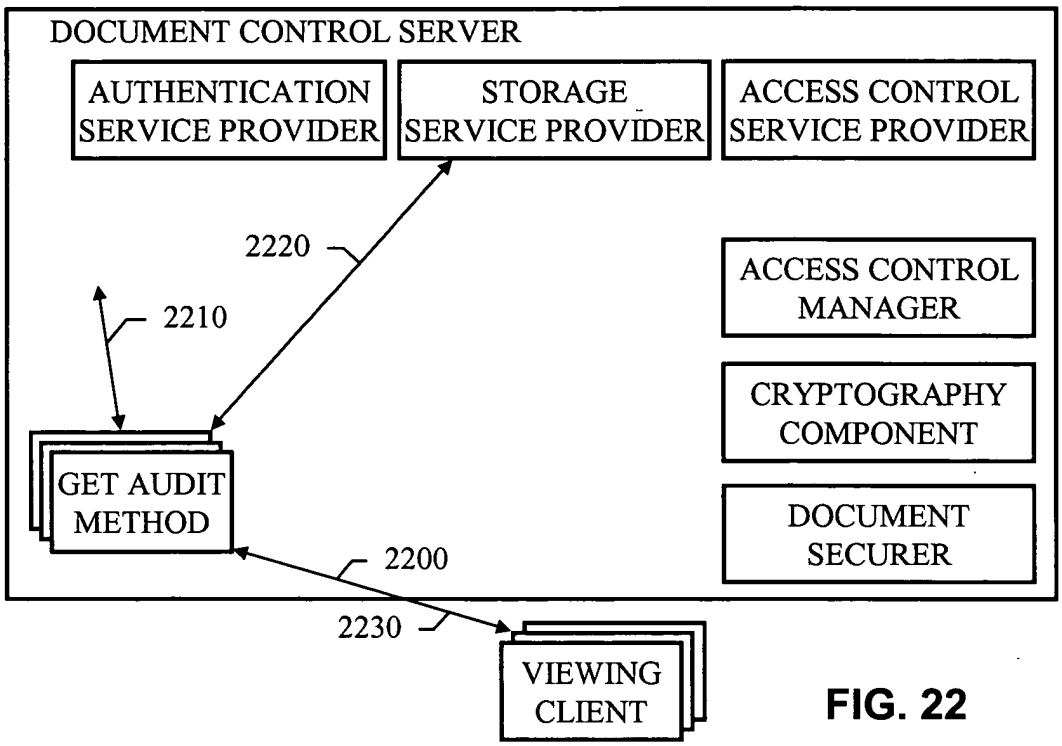

DOCUMENT CONTROL SERVER
AUTHENTICATION SERVICE PROVIDER
STORAGE SERVICE PROVIDER
ACCESS CONTROL SERVICE PROVIDER
2220
2210
ACCESS CONTROL MANAGER
CRYPTOGRAPHY COMPONENT
GET AUDIT METHOD
DOCUMENT SECURER
2200
2230
VIEWING CLIENT

FIG. 22

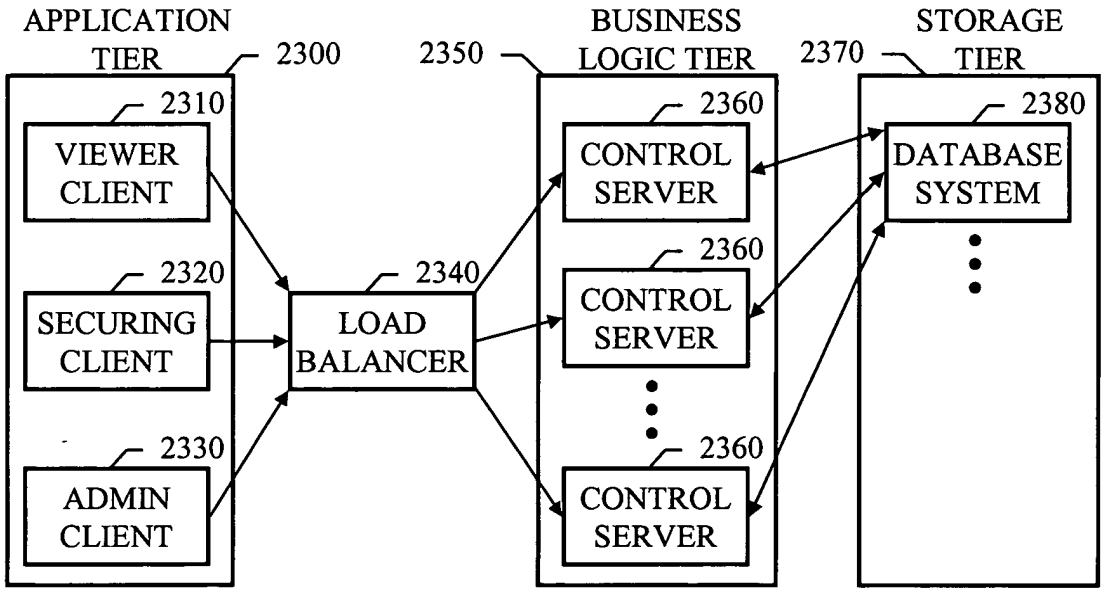

APPLICATION TIER
2300
2350
BUSINESS LOGIC TIER
2370
STORAGE TIER
2310
VIEWER CLIENT
2320
SECURING CLIENT
2330
ADMIN CLIENT
2340
LOAD BALANCER
2360
CONTROL SERVER
2360
CONTROL SERVER
2360
CONTROL SERVER
2380
DATABASE SYSTEM

FIG. 23